

WHAT IS CLAIMED IS:

1. A device cooperating with a pump for guiding a contrast medium from a source of said contrast medium to a catheter for delivery to a patient's vascular system, comprising:
  - a dual check valve having:
    - an inlet port connectable to the source of contrast medium,
    - an inlet-outlet port connectable to the pump, and
    - an outlet port;
  - a tubular member coupled to said outlet port;
  - an in-line check valve connected to said tubular member at a point spaced from said dual check valve for preventing fluid flow towards said dual check valve; and
  - a three-port stopcock connected at a first port to said in-line check valve, a second port of said stopcock being operatively connectable to the catheter.
2. The device defined in claim 1 wherein said in-line check valve is a dual check valve having an additional inlet port connected to said tubular member, an additional outlet port connected to said stopcock, and an additional inlet-outlet port operatively connectable to an ancillary pump.
3. The device defined in claim 2 wherein said ancillary pump is a syringe.
4. The device defined in claim 2, further comprising an additional stopcock disposed between said ancillary pump and said additional inlet-outlet port.

5. The device defined in claim 2 wherein said dual check valve, said tubular member, said in-line check valve and said stopcock are all permanently bonded to one another.

6. The device defined in claim 1 wherein said dual check valve, said tubular member, said in-line check valve and said stopcock are all permanently bonded to one another.

7. The device defined in claim 1, further comprising an additional stopcock disposed at said inlet port for connecting said inlet port to said source.

8. A system for delivering a contrast medium to a patient's vascular system, comprising:

a source of contrast medium;

a pump for moving contrast medium from said source into a patient;

a dual check valve having:

an inlet port connectable to said source,

an inlet-outlet port connectable to said pump, and

an outlet port;

a tubular member coupled to said outlet port;

an in-line check valve connected to said tubular member at a point spaced from said dual check valve for preventing fluid flow towards said dual check valve; and

a three-port stopcock connected at a first port to said in-line check valve, a second port of said stopcock being operatively connectable to the catheter.

9. The system defined in claim 8 wherein said in-line check valve is a dual check valve having an additional inlet port connected to said tubular member, an additional outlet port connected to said stopcock, and an additional inlet-outlet port operatively connectable to an ancillary pump.

10. The system defined in claim 9 wherein said ancillary pump is a syringe.

11. The system defined in claim 10, further comprising an additional stopcock disposed between said ancillary pump and said additional inlet-outlet port.

12. The system defined in claim 10 wherein said dual check valve, said tubular member, said in-line check valve and said stopcock are all permanently bonded to one another.

13. The system defined in claim 8 wherein said dual check valve, said tubular member, said in-line check valve and said stopcock are all permanently bonded to one another.

14. The system defined in claim 8 wherein said pump is a syringe.

15. The system defined in claim 8, further comprising an additional stopcock disposed between said inlet port and said source.

16. The system defined in claim 8 wherein said source is a flexible bag.

17. A method for supplying a contrast medium to a patient's vascular system, comprising:

providing a flexible bag filled with contrast medium at essentially atmospheric pressure;  
operatively connecting said flexible bag to the patient's vascular system via a gas transfer system;

purging said gas transfer system of air; and

after purging said gas transfer system of air, delivering contrast medium from said flexible bag through said gas transfer system to the patient's vascular system.

18. The method defined in claim 17 wherein said gas transfer system includes a dual check valve having an inlet port, an outlet port and an inlet-outlet port, the connecting of said flexible bag to the patient's vascular system including connecting said flexible bag to said inlet port, the delivering of contrast medium including operating a pump to draw contrast medium from said flexible bag through said inlet port into said dual check valve, the delivering of contrast medium further including operating said pump to force contrast medium from said dual check valve through said outlet port, an in-line check valve, a stopcock and a catheter to the patient.

19. The method defined in claim 18 wherein the purging of said gas transfer system includes operating said pump to flush air from a tubular member extending from said outlet port to said in-line valve and subsequently operating said first stopcock to allow blood flow from the patient through said catheter and out a port of said stopcock.

20. The method defined in claim 17 wherein the providing of said flexible bag includes filling said bag with contrast medium and emptying said bag of its contents and repeating these steps multiple times.

21. The method defined in claim 19, further comprising replacing the blood in said catheter with contrast medium in a separate procedure prior to the delivering of contrast medium from said flexible bag through said gas transfer system to the patient's vascular system.

22. The method defined in claim 20 wherein the replacing the blood in said catheter with contrast medium includes operating a pump to draw an aliquot of contrast medium from said bag and to subsequently push said aliquot into said catheter.

23. The method defined in claim 17 wherein the providing of said flexible bag includes filling said bag with contrast medium and emptying said bag of its contents and repeating these steps multiple times.

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